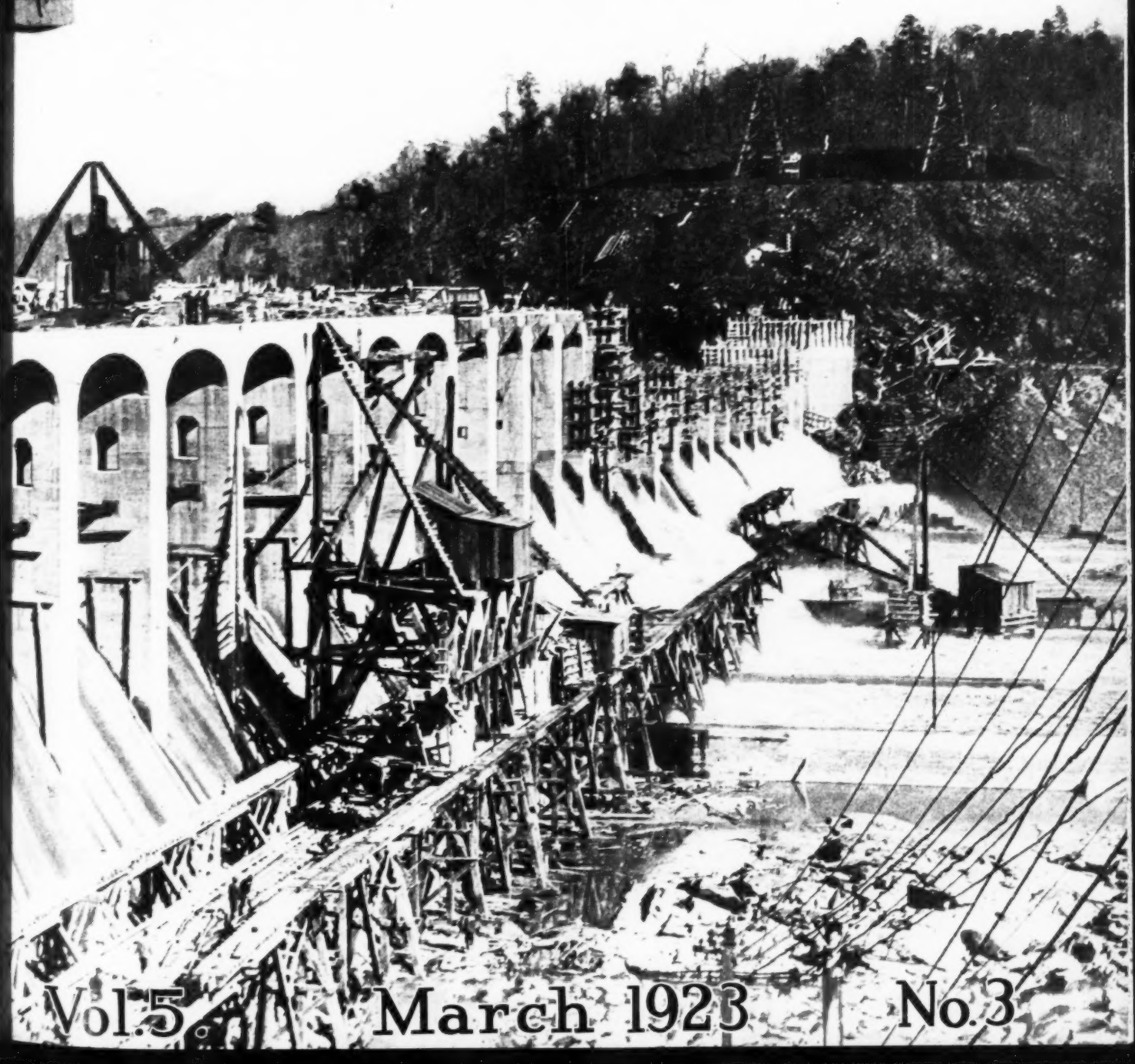
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



Vol. 5 March 1923 No. 3

Standardized Practice in Highway Building

EXPERIENCE in modern highway construction, which is merely the testing of theory by practice, is rapidly working out highly standardized methods and equipment. Everyone in any way connected with the highway building industry knows that this development was strongly apparent in 1922.

In 1923 the man who seeks highway building contracts must be equipped, as never before, to handle the job not only with the quality but with the speed that the records of recent years have proved to be easily possible.

The use of the short wheelbase Autocar motor truck by highway contractors in all parts of the country has shown each year an increase which is proportional to the growth, of modern speed and standardization of practice. The result is that Autocar trucks are now regarded by successful contractors and by highway officials everywhere as standard equipment for modern highway construction hauling.

A new illustrated booklet, which describes in detail the work done during the 1922 season by 300 highway contractors in all parts of the country, has just been issued by The Autocar Company who will gladly send a copy of it, free of charge, to any reader of Successful Methods.

The pictures in this Highway book show various types of highway building equipment such as loading hoppers and other details which have been practically standardized by successful contractors during the past few years. It also records 700 Autocar trucks (a large number being the 2 to 3 ton 4-cylinder model) which were used by highway contractors during 1922 to build more than 1200 miles of highways in 26 different states.

These are the states in which Autocars built roads in 1922

California	Florida	Maryland	New Jersey	Rhode Island
Colorado	Georgia	Massachusetts	New York	South Carolina
Connecticut	Illinois	Michigan	North Carolina	Vermont
Delaware	Iowa	Missouri	Ohio	Virginia
District of Columbia	Maine	Nebraska	Pennsylvania	West Virginia
		New Hampshire		

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Wherever there's a road

Capacities, 1 to 6 tons

Chassis prices, $1100 to $4350
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Successful Methods

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Some Highway Maintenance Problems

HIGHWAYS have been improved at such an astounding rate in this country in recent years that public attention has been focused largely on new construction. Highway maintenance work also lacks the spectacular that makes a good newspaper story. There further has been a failure in many States to sell the taxpayer on the fact that the day a new road is opened provision must be made to begin maintenance on it. At the same time, public demand grows apace for better upkeep on roads of even limited local importance.

Collectively, the States are spending vast sums annually on highway maintenance work. Several of the States, notably Iowa and North Carolina, recently have developed very comprehensive maintenance programs. Some of the States in which improved highways have been built extensively for a long time also are well organized for maintenance. In many States it has been necessary, however, to follow a policy of expediency.

Funds available for maintenance are inadequate in most States to cover the requirements. The money necessary for equipment has been particularly insufficient. Dependence fortunately could be placed in the last couple of years on surplus war stocks of tractors, trucks, rollers and other equipment. Much of this equipment will soon have to go into the discard. The States will then be confronted with enormous purchases of equipment to replace what the Federal Government furnished them.

Meanwhile, the unit costs of maintenance work have mounted rapidly of late. Much of the handling of materials for such work has heretofore been done by hand. With practically no common labor available, that is willing to do this kind of work, in many sections, more of this material handling must be done mechanically.

Equipment to meet the situation may be had. One good illustration of this is the article by Mr. Alexander Muir, elsewhere in this issue, descriptive of how a standard elevating grader is used in New Jersey to replace a large amount of hand labor and cut costs on gravel road maintenance.

Other similar new uses of standard equipment or adaptations of new types of machines must be made to meet the situation. SUCCESSFUL METHODS wants to help spread ideas of this sort which have been found efficient in cutting labor costs on maintenance work. Send us data and pictures of any schemes you have used in solving your maintenance problems. It is unnecessary to write a story that is ready for the printer. Just send us the facts and we will get them into proper shape.

300,000 Short

GENERAL MARSHALL of the General Contractors Association stated recently to the Senate Committee on Immigration that the construction industry already is short 300,000 men. His statement, doubtless, was based on fairly accurate estimates of the mid-winter situation.

What will the shortage be when work in the cold-winter States is going full swing again? How will this shortage affect wages, efficiency, prices of materials and equipment? Pertinent questions, these to every man in the construction industry.

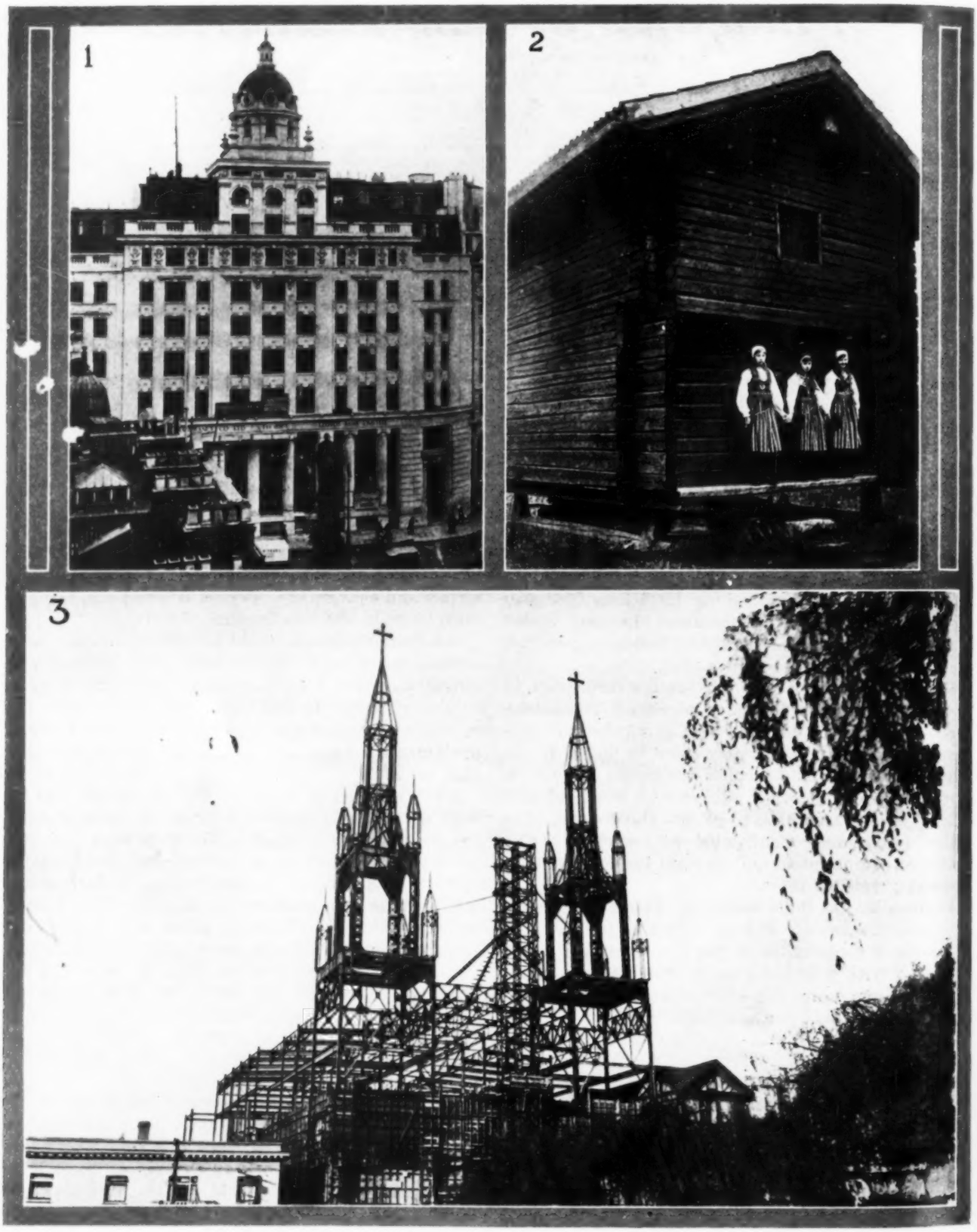
Whether organized labor will play fast and loose remains to be seen. Skilled labor rates could not be jacked up much higher without postponing a great volume of work. In fact, many investors already are wondering whether permanent improvements made at present wage rates can earn a fair return during a lean period.

Manufacturers of materials and equipment thus far have made few increases in prices, in spite of their reduced margins of profit. The 1920 peak and subsequent collapse of prices missed very few lines of industry. Producers of construction materials and machinery will unquestionably do everything in their power to avoid skyrocketing prices this year. They have seen one golden-egg goose killed too recently.

But the producers may not be able to control the situation. Raw material deliveries already are delayed. Prices of raw materials show an unpleasantly rapid upward tendency. Caution against taking on big stocks should save a runaway market, unless labor goes hog wild.

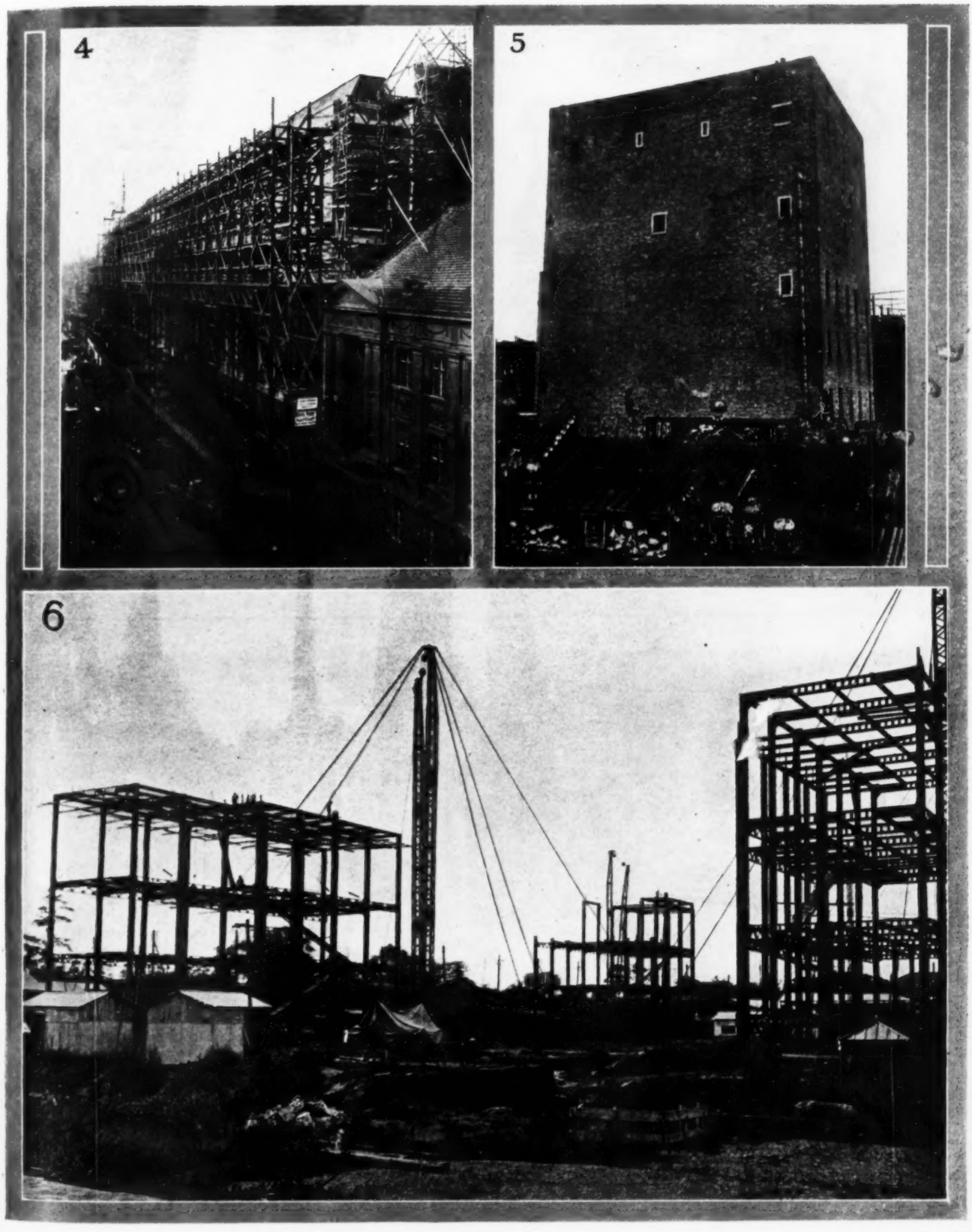
Construction men have recently waked up to the labor situation fast. One result will be that machinery will take the place of labor this year wherever a machine can do the work as cheaply as hand labor can do it. The old test that the machine must get lower costs than hand labor will not always be required. There is no way in which the construction industry can so certainly meet the labor shortage as by using machinery wherever possible.

Construction Style Sheet



1—An American plan building in London regarded by the Londoners as a typical New York skyscraper. It is 162 ft. high. © *P & A Photos*
2—Three Swedish orphans and the home they built with their own hands. © *P & A Photos*
3—The steel frame of a San Francisco church, the walls of which are to be built of concrete. © *International*

From Three Continents



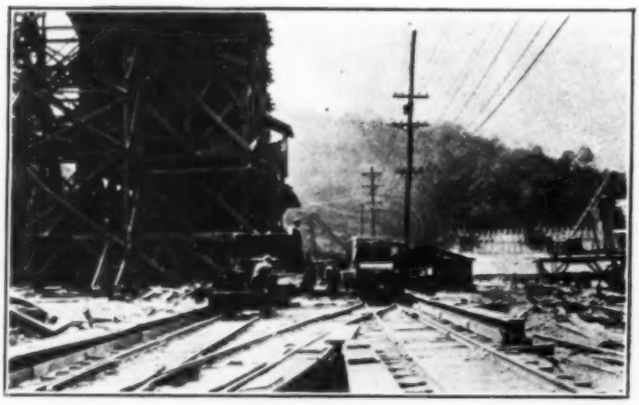
4—A big business structure under construction in Berlin. © *P & A Photos*
5—This is the type of building used by Chinese pawn shops. The construction is simple but the walls are thick. © *P & A Photos*
6—Japan is putting up modern steel frame buildings as may be seen from this photograph which was taken near Tokio. © *Keystone*

MITCHELL DAM NEARLY READY FOR WORK

Struct .e Near Birmingham, Ala., Will Supply Power This Spring. Some Construction Features

By L. G. Warren, Prin. Asst. Engineer,
Dixie Construction Co.

THE Mitchell Dam near Birmingham, Ala., which is being built for the Alabama Power Company by the Dixie Construction Company, is now nearing completion. Construction was begun in July, 1921, and it is expected that the actual generation of power will begin early this spring. The completion of the dam will give the Alabama Power Company a total generating capacity of 345,000 h.p., the capacity of the units of the company's system that are already installed and at work being approximately 235,000 hp.

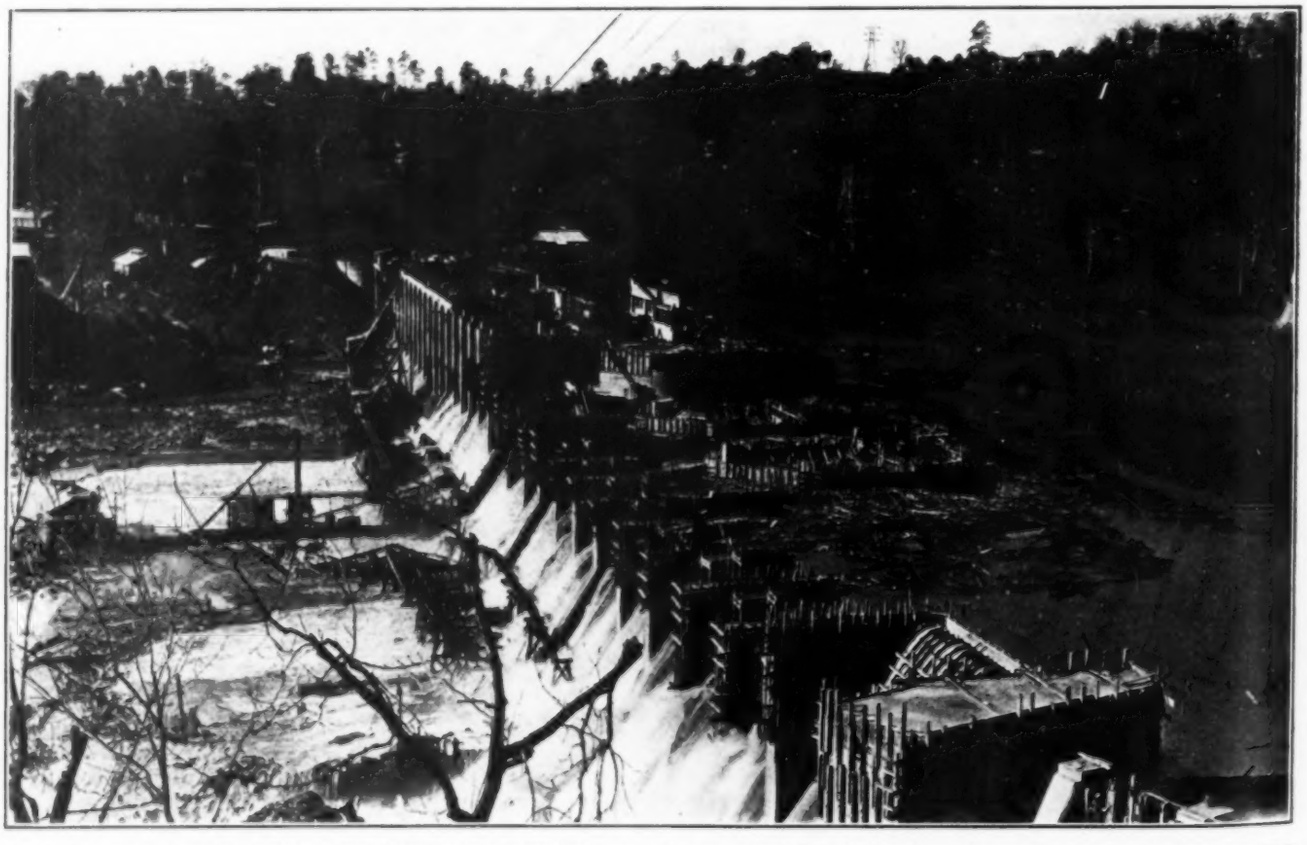


VIEW SHOWING MIXING PLANT

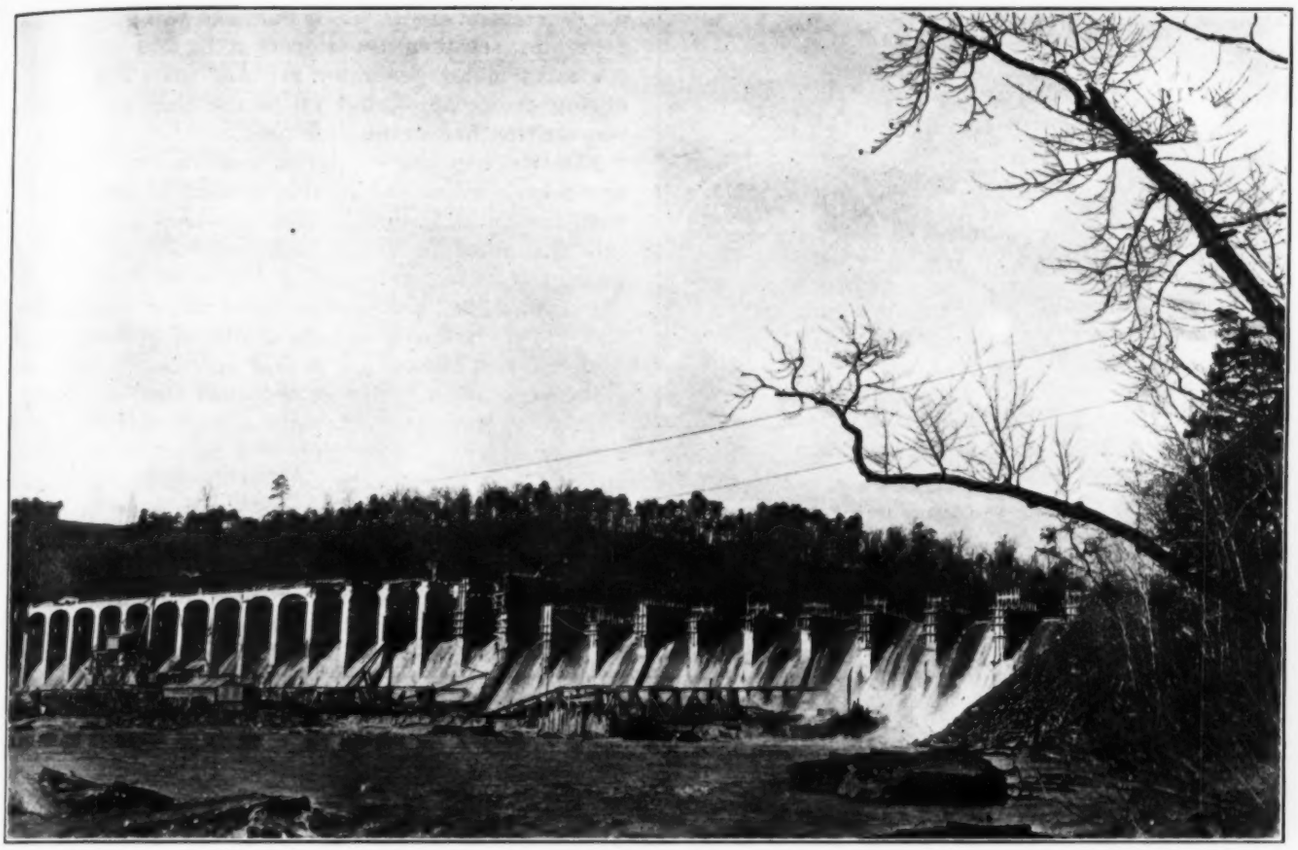
The photograph on the cover of this issue of Successful Methods and some of those accompanying this article show the Mitchell Dam as it appeared in January of this year. As may be seen, the pouring of the concrete is well on its way toward completion. The Mitchell Dam is on the Coosa River about 70 miles south of Birmingham and is a cyclopean concrete structure of the gravity type. The upstream face is straight and the downstream face is of the "Ogee" type. The maximum width of the dam at the base is 74 ft. 3 in. and at the crest 8 ft. 2 in. The length of the crest is 1146 ft. between abutments. The spillway length is 930 ft.

The excavation for the dam consisted of 78,000 cu. yd. of earth and 6360 cu. yd. of solid rock. Approximately 203,000 cu. yd. of concrete will be contained in the dam and four powerhouses which are a part of the plant.

An interesting feature of the construction of the



MANY INTERESTING FEATURES AND VAST DETAIL OF CONSTRUCTION MAY BE SEEN HERE. IN THE FOREGROUND THE LOCK WALL WITH THE EMERGENCY SPILLWAY SECTION ADJACENT TO IT



VARIOUS STAGES OF THE CONSTRUCTION OF THE SPILLWAY DECK PIERS ARE SHOWN IN THIS VIEW

Mitchell Dam has been the use of bulk cement on a large part of the job.

At the time of writing about 165,000 cu. yd. have been placed and about 41,000 barrels of bulk cement and about 148,000 barrels of sacked cement have been consumed in this yardage. The bulk cement cost 5 cents less per barrel than the sacked cement, if full refund of 40 cents per barrel were received for the return of the empty sacks, from the sacked cement. Of course the loss on damaged sacks would result in a greater difference in this comparison, to the advantage of the bulk cement.

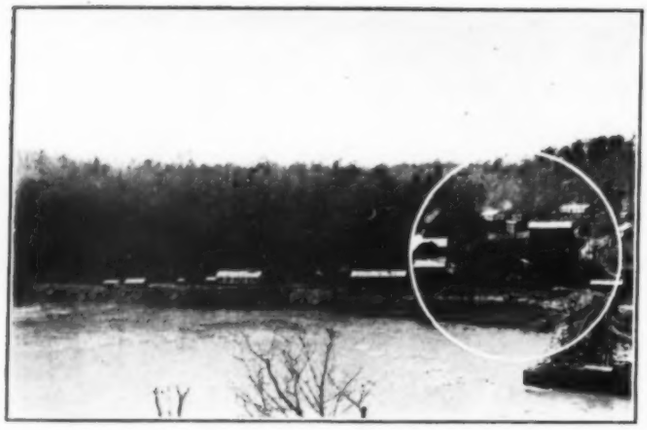
Satisfactory results have been attained with the bulk cement in the storage and handling of it, and also with the finished concrete. No serious trouble has occurred from the packing of the bulk cement in the storage bins. Bulk cement in deep bins, when filled, will become packed, if undisturbed for a few hours.

Material shipments for Mitchell Dam were received via the Louisville and Nashville Railroad at Coopers, Ala., in the terminal yards of the Dixie Construction Company. Cars were then transferred to the dam, 8 miles distant, by the construction company's traffic department over its railroad, built for this project. To guard against possible interruptions of cement shipments, two warehouses, for storing a total of 6000 barrels of cement, were built at Coopers. These were always maintained full. In addition, when the recent railroad strike was impending, a warehouse of light construction, to hold 6000 barrels, was built near the dam.

At the dam a similar warehouse was constructed, to hold 4500 barrels of cement. Adjacent to this warehouse and to the main line railroad tracks, the bulk cement bin was installed. The roof of the bin is level with the car tracks. This bin afforded a storage of 2400 barrels of cement. The bin has four hopper bottom compartments. These compartments feed the cement upon a 16-in. belt conveyor, through four 6-in. pipes, provided with shear gates. The 16-in. conveyor carries the cement to the 800-barrel capacity bin in the mixing plant. This conveyor is driven by a 10-hp. motor.

The mixer plant building is of timber construction, having a corrugated iron roof. It is 84 ft. high, 28 ft. wide and 56 ft. long. The building is divided into four stories. On the first floor 10 ft. above the ground, the two mixers each of 2 cu. yd. capacity, motor driven, are located. They dump directly by means of a short chute into the concrete buckets on narrow gage flat cars. The two 48-in. x 16-ft. revolving rock screens are situated on the top floor. The material bins are beneath the screens. The material bins floor is divided into two bins for plum rock, holding 220 cu. yd.; two bins for 3-in. size and under, crushed rock, holding 425 cu. yd.; one 260 cu. yd. bin for sand, and the 800-barrel capacity cement bin. From the latter cement bin, the cement feeds through two 10-in. pipes directly to two steel hoppers, mounted on trunnions. The 10-in. pipes are provided with shear gates for controlling the cement flow. A measuring hopper is located over the charging hopper of each mixer.

All measuring is done by volume, allowance being



GENERAL VIEW OF CRUSHING AND MIXING PLANTS

made by the weight of the cement when held in the measuring hoppers. This weight was found to be 77 lb. per cu. ft. Proportions of concrete are based upon weight of ceme[illegible]lk cement will pack and arch in bin, as noted previously, resulting in a rush through delivery pipes, when the arch breaks. To guard against spillage from such occurrence, a quick acting valve or shear gate should be employed. Delivery pipes from cement bins should not be less than 6 in. diameter. Smaller pipes will cause clogging of flow.

The cement from sacks in the warehouse at the dam is emptied into a short chute, which delivers it to the cement storage bin. The sacked cement is not allowed to remain in storage longer than two weeks, to avoid setting.

CEMENT WAREHOUSE AND SAND STORAGE HOPPER

Loaded cars of bulk cement are placed opposite the hatchways in the roof of the storage bin and are unloaded by laborers using scoop shovels. A power shovel, with motor-driven cable drum, housed in traveling house on top of cement storage bin was tried. The power shovel moved the cement in the railroad car to chute, leading from this car to the bin hatch. However, this shovel was not used often, due to the preference of the hand shoveling, held by the construction department.

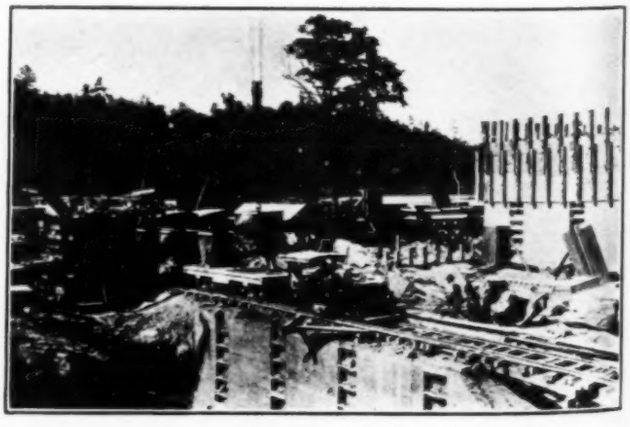
Another feature of the construction work at the Mitchell Dam which was commented upon in a previous issue of SUCCESSFUL METHODS, is the extensive use of electrically operated equipment throughout the plant. Haulage equipment, derricks, cableways, pumps, compressors and the mixing and crushing plant all are run by electricity furnished by a specially constructed 4400-volt transmission line 12 miles long and extending from the Mitchell Dam to Lock 12, where the Alabama Power Company is operating its 110,000 hp. hydro-electric plant. The current is transformed into 2300 a. c. current at the Mitchell Dam substation. A motor generator set then transforms it to 250 volt d. c. An extra motor generator set was installed for use during emergencies, but up to the time this article was written had never been used.

Electric haulage on large construction jobs has never been attempted in this section of the country until the building of this dam. Success has attended this inauguration, which will probably be followed by other contractors.

For handling excavated material and concrete, traveling, stiff leg derricks were employed in conjunction with the two cableways. These derricks in their elevated positions on the trestle loaded steel skips filled with rock from the excavations upon flat cars, and also transferred the concrete in 2 cu. yd. buckets from the flat cars to the forms. The derricks are shown. They are driven by 30-hp. motors. As many as six of these derricks have been in service at one time on this trestle. Power is supplied to the derrick motors by means of flexible cables leading from main power cables, suspended on the trestle. The height above the narrow-gage tracks permitted the trains to pass beneath them and gave wide range of operation to the derricks as well as to the trains.

Seven 8-ton 36-in. gage locomotives equipped with 30-in. steel tires, have been used for the haulage work. The power is supplied to them through contact shoes from a carefully guarded third rail carrying 250 volts d. c. placed about 21 in. outside of the running track. This third rail has been laid over the entire construction area. Where gaps in the rail occur, an automatic reel holding 200 ft. of electric cable is used.

O. G. Thurlow is chief engineer for the Alabama Power Company and Dixie Construction Company. L. V. Branch is resident engineer and H. L. Myer is construction superintendent at Mitchell Dam.



ELECTRIC LOCOMOTIVES HANDLING CONCRETE

STEAM SHOVEL MAKES GOOD RECORD IN CLEVELAND

IN the excavation for the foundation and in the basement work for the new Collinwood High School building at St. Clair and Ivanhoe Road, Cleveland, Ohio The Seldon Excavating Co. of that city accomplished some excellent results with a steam shovel which moved about 42,000 cu. yd. of dirt in 90 days.

The nature of the material was such that the shovel was up against the stiffest kind of digging every moment it was at work, the stratification running about as follows: clay, 6 ft.; blue shale, 9½ ft., and rock shale, 6½ ft. The average output of the shovel per day was 466 2/3 yd.

EXCAVATING 466 YD. A DAY

In addition to its use as a shovel, the steam power was used to operate an air compressor for drilling rock shale. About 13 days of the time was used to carry on this side line of work and of course this makes the daily output record much higher when figured out. The photographs on this page show the steam shovel at work. The smaller photograph shows the shovel at fairly close range and the difficult character of the material excavated. The larger photograph at the bottom of the page shows the site of the job with the shovel in the left background. At the time this photograph was taken the foundation was under way.

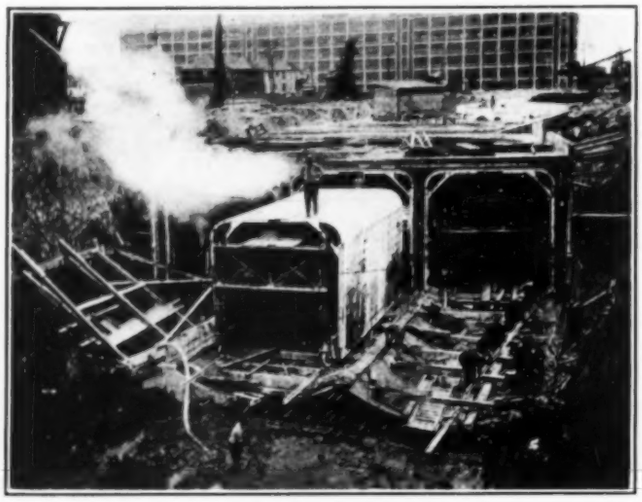
SITE OF THE NEW COLLINWOOD HIGH SCHOOL BUILDING AT CLEVELAND WHERE STEAM SHOVEL DID SUCH GOOD WORK

DETROIT'S BIG SEWER

Construction of Connors Creek Sections Carried on by Efficient Methods

ONE of the big construction jobs now under way is the Detroit sewer system. The City of Detroit has set apart $35,000,000 for the work and when completed a great sewer will encircle the city and will be able to care for a population of 3,000,000.

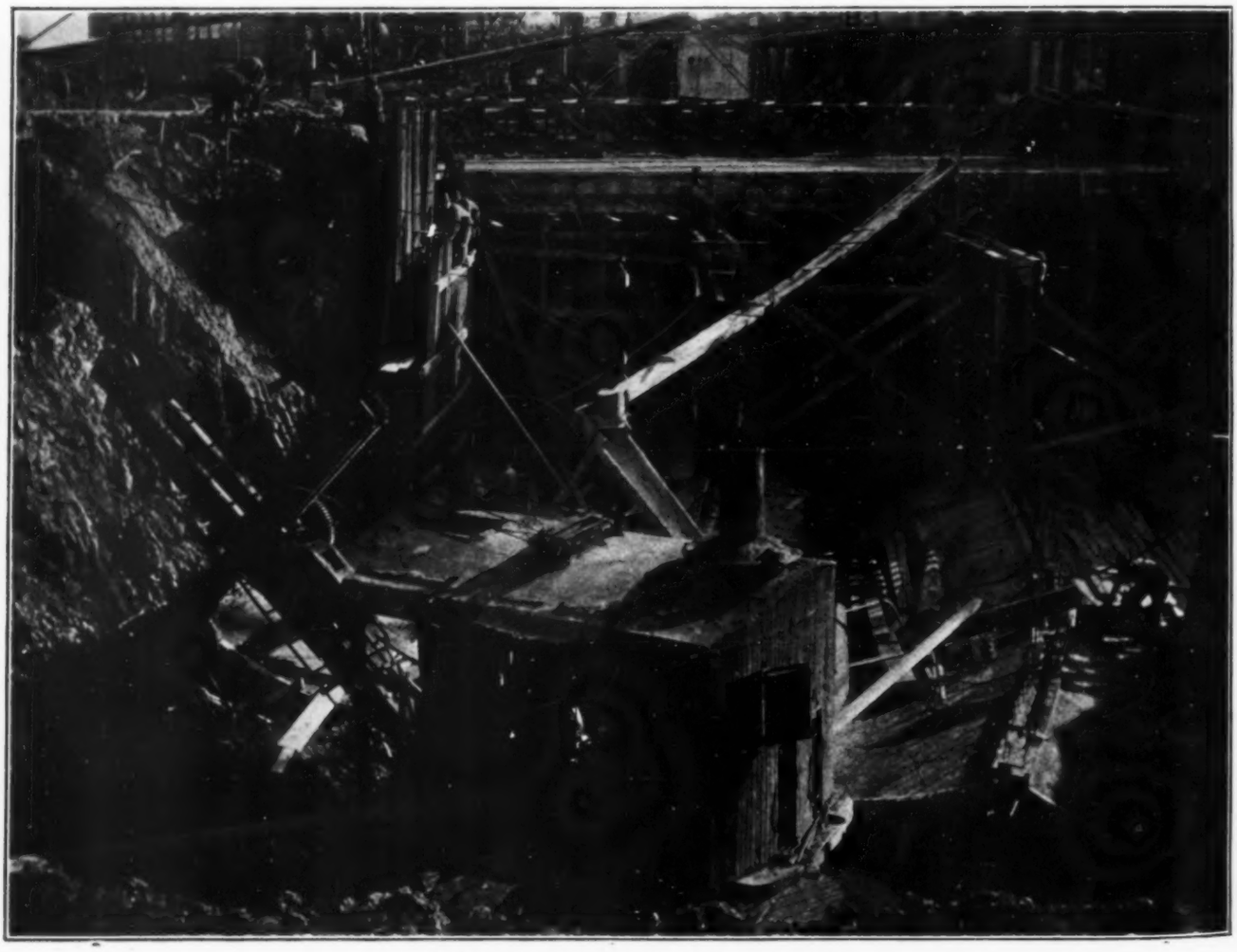
An important unit in this system is the Connors Creek Sewer, which will be 14 miles long. The construction methods used on sections 1 and 2 of this sewer, which are being built by the Gillespie Contracting Co. of New York for a contract price of $2,190,850, are described in this article.



ONE OF THE BIG FORMS WHICH HAS JUST BEEN PULLED THROUGH

This section of the sewer is situated in a part of the city where the drainage always has been very poor and a small stream called Connors Creek had to be diverted in order to permit the construction of the sewer. The first operation undertaken was the digging of a big open trench 60 ft. wide with an average depth of 30 ft. This was done with two steam shovels which removed the top soil and by a dragline which finished the work of excavation.

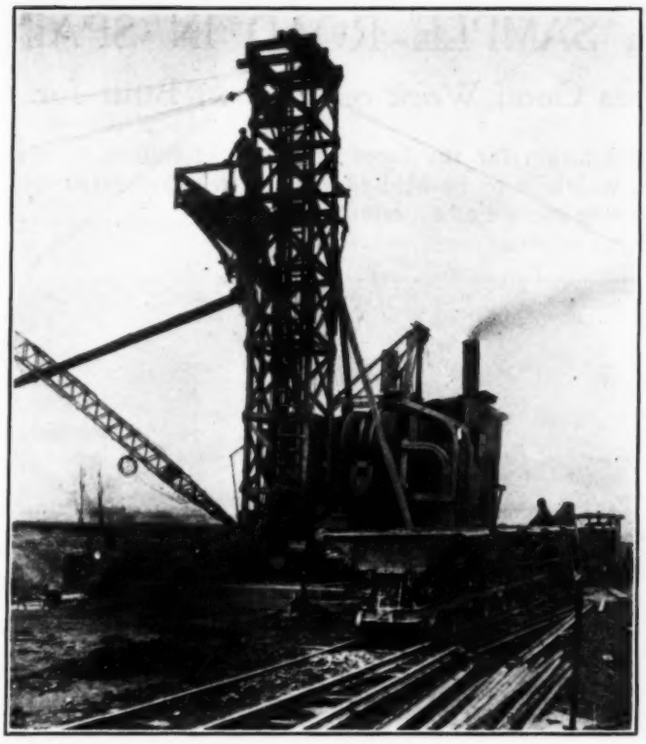
The photographs show clearly the methods used in the actual construction of the great concrete sewer. Collapsible steel forms were used, the first set of three forms being set up before any concrete was poured. While the



ON THE CURVES WOODEN FORMS ARE USED

pouring is going on, the second set of three forms is placed and when the first concrete has hardened the forms are collapsed, pulled through the second set while the concreting is still going on and made ready for the next operation. The forms are mounted on wheels running on steel rails, which make it an easy matter to pull them through and set them up in place again.

All construction materials are delivered by rail to the contractors' yard, where they are unloaded and transferred to elevated bins. From these bins they are taken to the job by industrial track, three 10-car trains being used. At the job the aggregates are dumped directly into the charging hopper of a steam-driven mixer which is installed on a traveling platform which moves along the side of the trench on ordinary railroad track. This traveling mixing plant is equipped with chute which is long enough to reach any part of the forms and the operation of placing the concrete is a simple one. The work has proceeded at the rate of about 20 ft. per day.



THE MIXING AND CHUTING PLANT WHICH MOVES ALONG THE TRENCH

The Detroit sewer construction program has been in effect for the last three years and has been in charge of C. W. Hubbell, who was city engineer for six years. As soon as the work is completed the city will have a model system.

GETTING READY TO POUR THE CONCRETE. STEEL REINFORCING IN PLACE

A SAMPLE ROAD IN SPAIN

Small Mixer Does Good Work on Section Built for Road Congress

AS a sort of permanent exhibition for the International Road Congress which is to be held in Seville, Spain, next May, a sample section of concrete road about 3 kilometers in length is being constructed on the outskirts of that city. American machines are being used and the road is of American design, although, of course, Spanish methods have their share in the actual construction work.

THE END OF THE SAMPLE HIGHWAY

THE PONDING METHOD OF CURING IS USED

The road on which the paving is being done is a Provincial road called Dos Hermanas and leads from Seville in the direction of Cadiz. It later will be connected with other avenues which will pass through

THIS IS THE SMALL MIXER WHICH IS DOING THE WORK OF A BIG PAVER

THE ROAD GANG ON THE JOB

the grounds of the Spanish-American exposition.

The cross-section of the road is 5 and 6 meters in width. The slab is 6 in. thick, reinforced along the edges by increasing the thickness to 9 in. It is similar to the slab in use on the roads of Maricopa County, Arizona, and to the new Illinois specifications.

The aggregates are obtained from the pit of the Guadalquivir River and hauled to the work on motor trucks. As it was necessary to get the job done in plenty of time for the Road Congress, and as it was impossible to bring a standard paver from America, a small portable mixer has been used. Extremely good results have been obtained and the crew in charge has become expert in moving the mixer as the work advances. It so happens that the section of road which is being built does not pass through an irrigated district, and it is necessary to bring all the water used in the mixer and for curing in a tank automobile truck.

The photographs show more clearly than words how the work is being done. The subgrade requires little or no preparation because of the fact that the concrete is being laid on an excellent macadam road that has been compacted for centuries. The increased thickness at the edges is obtained in most cases simply by taking advantage of the difference in the thickness of the crown of the macadam road as compared with crown of the concrete road, the concrete surface having a crown of only 1¼ in.

The man responsible for the building of this test road is Antonio Ibarra Miro, Ingeniero de Caminos. He has worked with the Spanish Asphalt and Cement interests and with Felix Ramirez, Director of Public Roads in the Province of Sevilla.

IOWA'S PROGRESS IN HIGHWAY DEVELOPMENT

THE progress which Iowa is making in road development is evidenced by a tabulation as of Jan. 1, 1923, of the condition of the State's primary road system. The total mileage in the primary system is 6615.3. Of this, there were on Jan. 1 2961.8 mi. of earth roads, 1761.1 mi. of permanently graded roads, 1558 mi. of gravel roads and 334.4 mi. of paved roads. This shows that now 28 per cent of the system is surfaced with graveled or paved roads and approximately 55 per cent, including the paved and gravel sections, are now graded.

The members of the State Highway Commission are: Chairman, William Collinson; J. W. Holden and A. Marston. The chief engineer is F. R. White.

COOPERATION PRODUCES SPEED

Busy Street in Dayton Repaired in Record Time When All Interests Concerned Work Together

By Ivan E. Houk, City Engineer, Dayton, Ohio.

COOPERATION is the keynote to progress in paving city streets as well as in any other work involving a number of interests. The contractor working on county roads where no pipelines, sewers or conduits are located is dependent more or less on his own initiative and resources for his progress. But in the city conditions are different. There the contractor must work hand in hand with the various public utility corporations if he is to make satisfactory headway.

LAYING CONCRETE BASE. IT WAS MADE 8 IN. THICK IN DOUBTFUL PLACES

TAMPING DRY CONCRETE UNDER STEEL TIES

E. D. MURRAY, CONTRACTOR, AT THE LEFT, KEEPS HIS EYE ON THE JOB

This was clearly illustrated in Dayton, Ohio, last fall, in connection with the paving of South Main Street, where it was necessary for as many as eight different gangs to work on the street before the concrete base could be laid. On some occasions, five different gangs were working simultaneously.

The contract was awarded to E. D. Murray of Dayton on July 26, 1922, but because of the uncertain manufacturing and transportation conditions, caused by the coal and railroad strikes, it was not possible to begin work until Sept. 27. Although the section included in the contract was only one block long, it was located near the heart of the business section and on one of the busiest streets in the city. Consequently the city could not allow the street to be torn up until the necessary paving materials were at hand. The granite curb, which had to be shipped from Georgia, was responsible for the first delays; but later, the wood block, with which the shoulders were paved and which came from a point within 150 miles of Dayton, also caused serious holdups.

The total amount of the contract was $24,247. The next higher bid was $26,812, or about 10 per cent more. Prices for paving included grading, and 6-in., 1-3-6, concrete base. Wearing surfaces were laid on a mortar cushion, 1-4 mix, and were filled with asphalt. Mr. Murray's bid on time was 30 working days. The next higher was 50 days, and the other two bids received, each 60 days.

Through the hearty cooperation of all parties involved, the work was pushed through at the utmost speed from the date of beginning. The west side of the street, which included the location of the sanitary relief sewer as well as the gas main, was dug up first. The original plan was to complete one side before starting the other. After considering that such a course in view of the comparatively late start would make it impossible to complete the job before winter set in, the city decided to block the entire street. Although this caused considerable objection from the property owners, it was undoubtedly wise.

Expanded metal reinforcing sheets, 8 ft. long and 5 ft. wide, and weighing 28 lb. per 100 sq. ft., were placed crosswise over the trenches wherever there was any doubt as to the trenches being properly settled. The concrete base also was made 8 in. thick in such places. The street car company replaced its wooden ties with steel ties, ballasting under the latter with dry concrete and making the change without interfering with car operation. In fact, all the track repair and alignment, as well as the paving, was done without detouring the cars. Concrete headers, to protect the wood block shoulders, were built 18 in. from the outside rails.

The job was completed Dec. 11, just before inclement weather set in. After deducting Sundays, holidays and delays caused by rain and wood block deliveries, the contractor had a balance of one day in his favor. W. C. Wangler, assistant engineer, in charge of the Bureau of Design and Construction, had general supervision of the work, while Adam Schwind, his assistant, was in direct charge. George F. Baker is Director of Public Service, and the writer, City Engineer.

THE FINISHED JOB ON A BUSY DAY

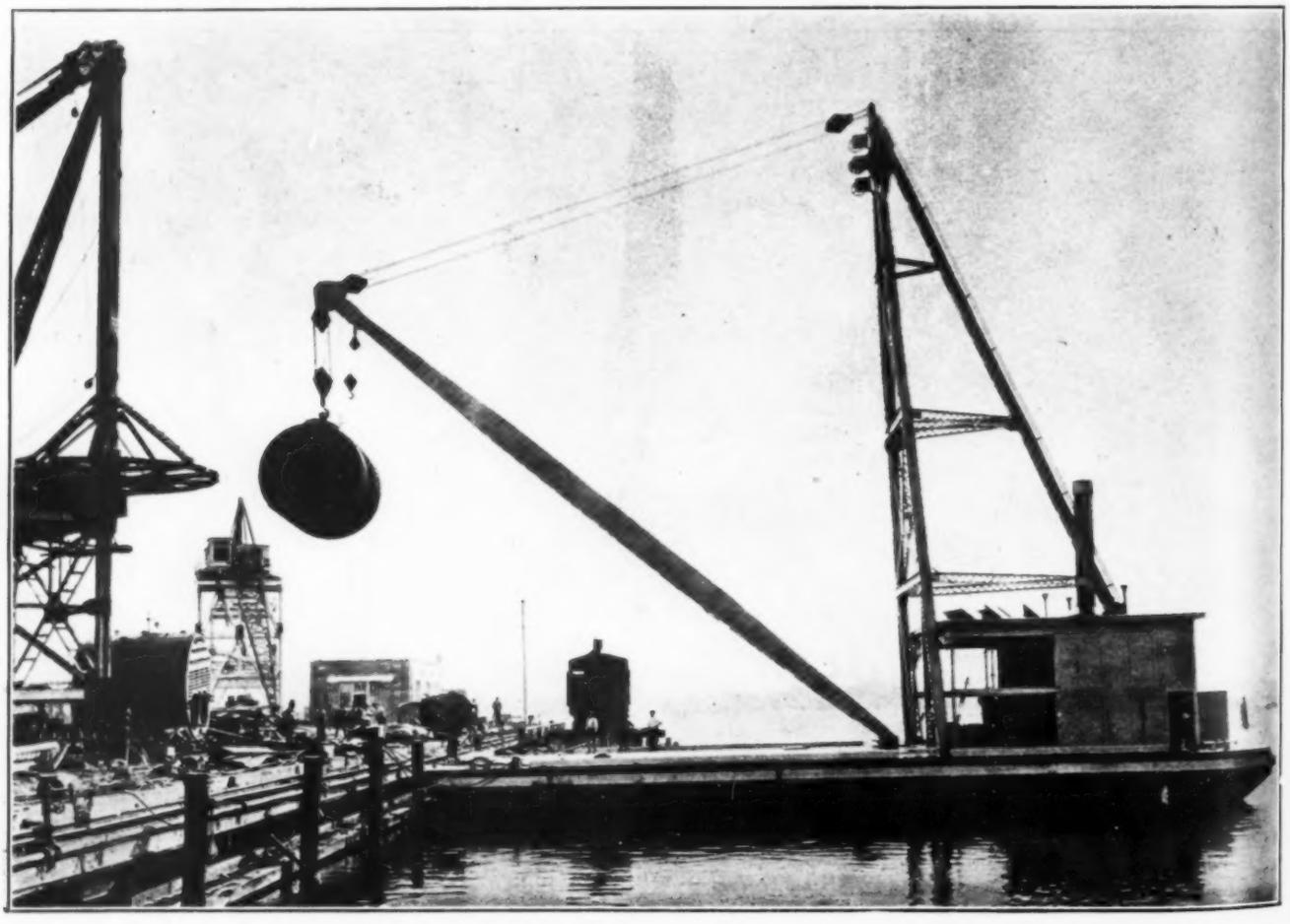
HANDLING HEAVY LOADS

THE handling of big units used in construction work is always an important factor in saving both time and money and the Southern Pacific Railroad has recently increased its facilities at New Orleans by adding a 40-ton derrick barge which enables it to take care of almost any piece of heavy equipment that comes along.

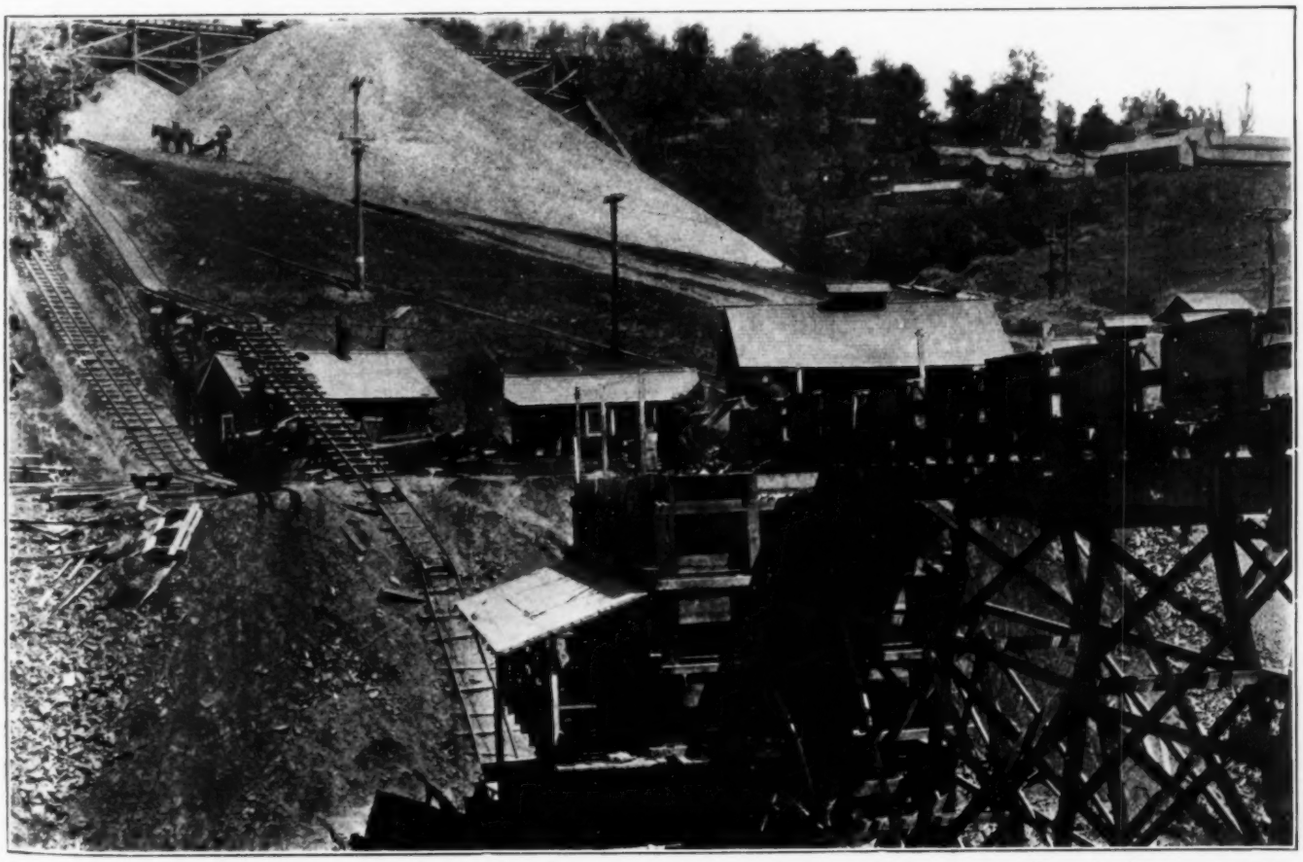
The two photographs on this page show this barge handling a big boiler. An unusual feature which will undoubtedly be noticed at once by those readers of SUCCESSFL METHODS who are familiar with the use of derricks, is the absence of the usual swinging lines which so often get in the way when handling loads of unusual size. The boom is swung by a 9 by 10 engine located on deck and worked through a train of gears under the deck.

Since this boat has been in service it has been making a record in derrick service and has lifted loads as great as 30 tons. It is used for unloading ships and handling all sorts of material about the harbor, where speed in handling is necessary.

The hull of the barge is 90 ft. long, 45 ft. wide and 9 ft. deep. The A frame is 80 ft. in height, the spread at base is 32 ft. and the spread of the back leg is 30 ft. The boom is 80 ft. in length and 36 in. deep at the center with a spread at heel of 6 ft.



Materials for the Hetch Hetchy Dam



These photographs show two of the rock crushing plants which supply materials for San Francisco's great water supply project. The upper photograph shows the crusher at Big Creek, and the lower the crusher at the Priest Dam

THE ELEVATING GRADER AS A MAINTENANCE MACHINE

New Jersey Highway Department Finds This Unit Most Efficient in Taking Care of Gravel Roads

By A. W. Muir,
Superintendent of Maintenance, New Jersey State Highway Commission

THE gravel used in the construction of gravel roads in the southern portion of New Jersey has clay for its principal binding agent. Many of these gravel roads are subject to heavy traffic, with the result that during the dry summer season there is considerable abrading of the surface, and as a consequence the finely divided material, such as clay, is blown away and there is left upon the surface the coarser sand and the pebbles. The sand and pebbles without the clay become what is known by gravel men as "dead gravel," owing to the fact that it will no longer bind and form a dense, hard surface.

THE SKILL WITH WHICH THE MATERIAL IS LOADED INTO THE SIDE OF THE TRUCK IS SHOWN IN THIS PHOTOGRAPH

This dead material is, therefore, scraped off to the sides of the road, where, if allowed to accumulate, it will in time form windrows, which not only seriously impede drainage, but also very materially narrow the width of the roadway. It is, therefore, necessary to remove this material from the sides of the road. In the past such removal has generally been done by hand, the material being shovelled into wagons or trucks and carted away. Where removal has been neglected for a considerable length of time the windrows frequently became as much as 4 to 5 ft. in width and 1 to 2 ft. in depth, so that their removal by hand becomes an exceedingly costly proposition.

Such a condition confronted the New Jersey State Highway Department in 1921, and other means of handling the proposition were sought, with the result that it was decided to try out an elevator grader on the work. The illustrations accompanying this article show the method adopted in handling the work. They do not, however, show the windrows, as the pictures

LOADED TRUCK READY TO LEAVE WITH AN EMPTY TRUCK WAITING TO TAKE ITS PLACE

were taken at a time when the work was practically completed at this point.

It will be noted that there are two men in the truck assisting in loading. It was found necessary to place men in the trucks in order to trim the load, particularly in the cases of trucks having high-sided bodies, where it was not possible to get the trucks close enough to the grader to distribute the material without hand-trimming. It was also found that the material was slightly difficult to handle owing to the fact that it had a tendency to slide back on the belt, as it was largely composed of sand and pebbles. For that reason it was necessary to keep the elevator at as low an angle as possible. By keeping the elevator low the difficulty in handling the material on the belt was eliminated, but it was delivered all on one side of the truck. Owing to the fact that the material being handled is objectionable on the center of the road, it was necessary to stop the tractor and grader while a loaded truck was coming out from under the grader and an empty one was going under. The greatest efficiency from all equipment, therefore, demanded that a full load be placed in every truck, thus giving an added reason for hand-trimming of the material on the trucks.

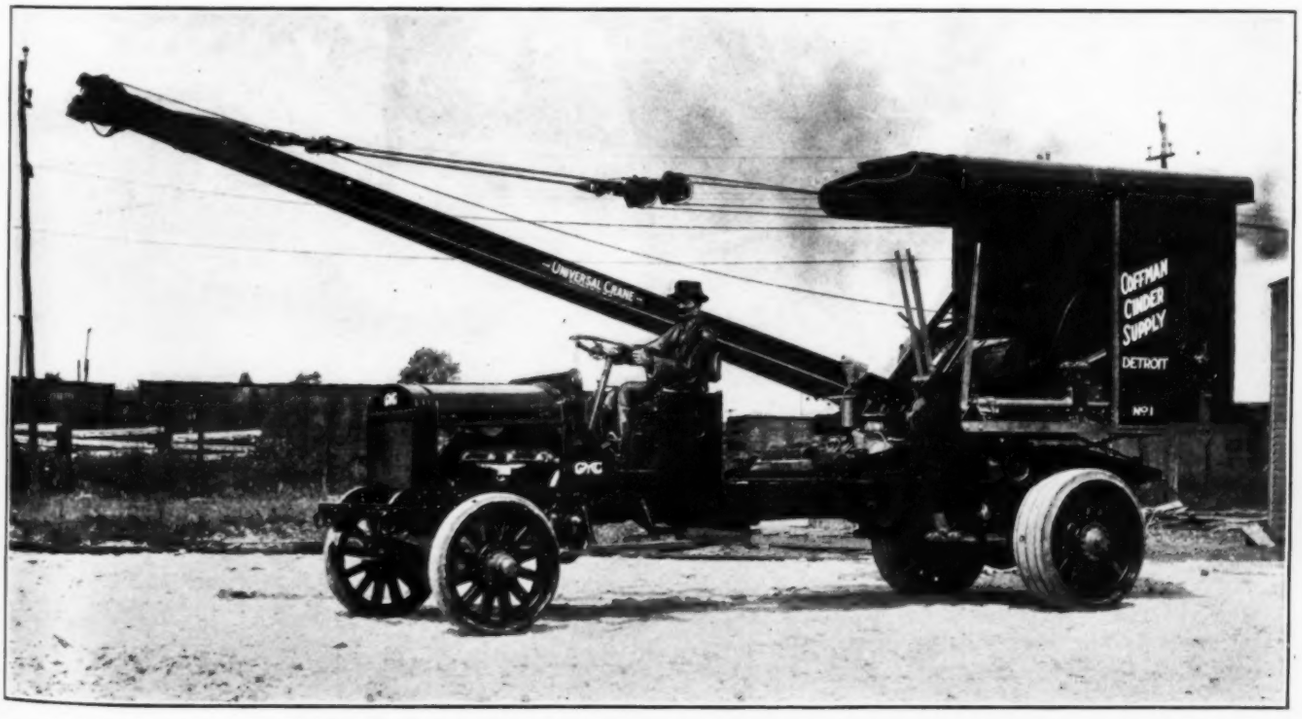
THE MAN IN THE TRUCK IS THERE TO TRIM THE LOAD

By means of the method adopted it was possible to load a 5-ton truck with the material in approximately 3 minutes. The material was handled at a cost of from 40 to 50 cents per cubic yard, which was considered very reasonable in view of the fact that in many cases the haul for the disposal of the material ran as high as a mile, and the costs were further increased owing to the fact that difficulty was frequently experienced with the trucks becoming stuck on the dump, owing to the soft nature of the soil in South Jersey. Despite this handicap the work progressed smoothly.

CRANE MAKES 600 MILE JOURNEY

LONG-RANGE service in material handling is being practiced by Coffman's Crane Service of Detroit, Mich. A crane mounted on a motor truck recently was driven from Detroit to Chicago and back leaving Detroit Thursday morning and arriving in Chicago Saturday afternoon, the distance covered being 300 mi.

On the return trip the crane left Chicago Saturday morning and arrived in Detroit at noon on Monday. This trip was made in the middle of January when the roads were in none too good condition. During the coming season, the Coffman Crane Service intends to develop work among highway contractors. The operating cost of the crane has been reduced to about $14 a day.



CROSS COUNTRY CRANE EN ROUTE FROM DETROIT TO CHICAGO

LOADERS CLEAN UP ON ROAD JOBS

Contractors Find They Save Labor and Time on City Paving Work in South

THE labor-saving qualities of machinery have been clearly demonstrated in the last few months by two city paving jobs in the South. The Freedlund Construction Company of Miami, Fla., and the Moore construction Company of Nashville, Tenn., have been using bucket loaders in cleaning up after grading operations.

WORKING ITS WAY ALONG

The photographs which appear on this page were taken on the Freedlund job in Miami. The upper picture shows the loader in the distance and in the foreground the loosened material which it is picking up. The lower photograph shows a truck being loaded.

On the Nashville job records were kept by the superintendent and they showed that the use of the loader saved 25 laborers. In addition to that, on one particular job the last 10,000 yd. were moved with the loader in just one-third the time the first 10,000 yd. were moved with hand labor.

"We are revolutionizing city paving methods here by the use of this loader," Superintendent Carr said. "We have had to revamp our own ideas and system first and struggle through to the proper coordination of scarifier, scraper and trucks, but we have reached that now and are the envy of every other contractor who has come to inspect our work.

"Yesterday we cleaned up completely 1455 sq. yd. of road which had been graded down from 6 in. to 18 in. over the whole area with a 12 in. depth a fair average. Figuring that as 485 cu. yd. it may be seen that this is a mighty good record. We do not do that every day, but we have averaged better than 250 cu. yd. per day since the job started, counting stops not due in any way to the loader."

The Moore Construction Company bought its loader in April, 1922, for use in Lewis County, for loading "chert," as gravel is called in the South, direct from bank to trucks. This job was completed with satisfaction and profit, and incidentally the performance of this machine was the means of showing the way to two other contractors in adjacent territory, who adopted the same method. They find it satisfactory for cleaning up all kinds of material.

FILLING MOTOR TRUCKS ON GRADING JOB

Steam Hammer Extracts Piling

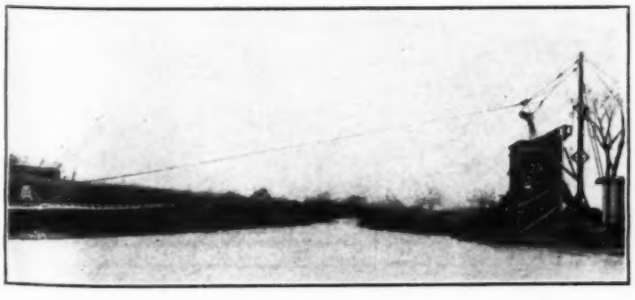
WHEN building Connors Creek Sewer at Detroit, the contractors use thousands of steel sheet piling which become frozen into the ground during cold weather. These have to be used over again as

the job proceeds and how to pull them proved a problem until one of the engineers hit upon the idea of reversing the steam hammer and driving them out.

A large U bolt is threaded through the eye of the piling and five strands of ¾-in. cable are run through the U bolt and around the hammer. When the steam is turned on, the hammer strikes against the cable, forcing the piling up.

Dragline Handles Material Under Water

A DRAGLINE cableway excavator is in use for widening and deepening the hydraulic canal at Cohoes, N. Y. It was necessary to keep the hydro-electric plant in operation and equipment had to be used that could handle wet material. The dragline excavator was installed with a 400-foot span. During the first month of operation, the cableway excavated over 7,000 cu. yd. of earth, all under water. During the second month the plant handled 4,650 cu. yd. of earth and 2,630 cu. yd. of rock. The rock was shale, which required but little blasting.



The accompanying photograph shows how the cableway spanned the channel and delivered the material to a hopper. Water from the canal was pumped into the hopper and the spoil was sluiced to the river bank near the power house.

A $12 Gravel Trap

THE gravel and dirt trap which is shown in the two photographs accompanying this article has been in successful use for highway maintenance in New

Mexico. It was devised by J. B. Easter, one of the District Engineers of the State Highway Department.

The trap is loaded with teams and fresnos and is so arranged that the truck in backing under throws a lever releasing the trap door which is made in two sections hinged to the floor of the trap and fastened

by rigid and swinging hooks in the center. The door when closed is in the shape of a shallow letter "V" swinging down and out to open. For a 2-cu. yd. load the trap door opening is made 3 ft. wide by 7 ft. long.

The loading is done so quickly that the only time required is that needed by the driver to shift gears from reverse to forward. By using second-hand lumber, this trap was constructed at the cost of $12.00 including digging the pit.

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MANY of the manufacturers of engineering machinery whose announcements appear in this publication handle their export business through a common department—the Allied Machinery Company of America.

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THE UNIVERSAL CRANE COMPANY
Elyria, Ohio

The Allied Machinery Company will follow the same methods which it has used in building up all over the world the business of these and other important American manufacturers of construction machinery and equipment.

Men from the factories of the above manufacturers will be resident in New York City to give customers expert service.

Stocks of the machinery and equipment made by these manufacturers will be maintained in New York City to insure prompt deliveries. Repairs also will be carried in stock so that customers may obtain immediate replacements.

Offices will be continued at the Allied Construction Machinery Centre, 139-149 Centre St., New York City, where these manufacturers and several others have for some years maintained the largest permanent exhibit of this kind of machinery and equipment ever undertaken.

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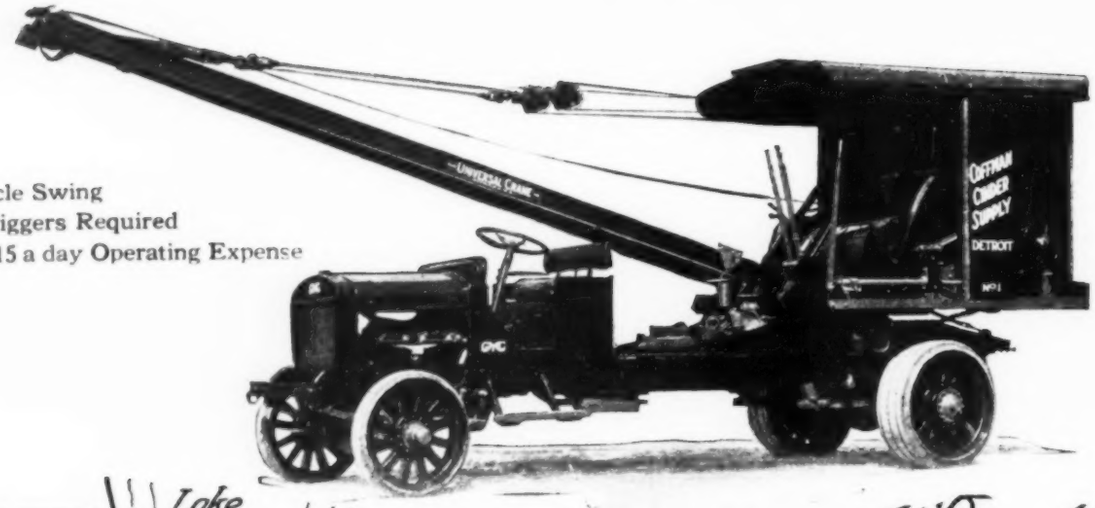

Ready for Crane Service Anywhere

COFFMAN'S Crane Service of Detroit operate two Universals on used G.M.C. trucks. One covered the trip shown to Chicago and return in January, 765 miles, averaging 125 miles a day over snow covered winter roads at truck speed. The performance so impressed the owners that they now plan to handle work with these machines for contractors all over the state of Michigan.

Because Universals have full circle swing, require no outriggers, cost little to operate and are ready the instant they get to a job, they earn from $50 to $200 net a day. There is always plenty of work for Universals to do the year round.

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